

**ABSTRACT OF THE DISCLOSURE**

Construction of printed circuit boards (PCBs) containing electromagnetic shielding and conductive tubes forming signal lines and/or waveguides. The method of construction calls for forming of grooves through layers of the PCB and coating the interior surfaces of these grooves with conductive material. These conductor-coated groove walls serve as conductive surfaces between embedded conductive surfaces on different layers. The conductive surfaces thus joined form a continuous electrically conductive surface that can be configured to act as an electromagnetic shield. Such conductive surfaces may be configured with internal conductors to act as a signal line, or without internal conductors to act as a waveguide.